Role of Pulsatile Stretch in Controlling Adenylate Cyclase and G Protein (G_{sa45}) Steady State Levels in Porcine Coronary Vascular Smooth Muscle Cells

Ira Mills, Ph.D., Department of Surgery, Yale University School of Medicine, New Haven, CT 06510

Previous studies from our laboratory demonstrated that brief (5 min) pulsatile stretch causes inhibition of adenylate cyclase activity in cultured coronary vascular smooth muscle cells. It is hypothesized that chronic cyclic stretch causes sustained inhibition of adenylate cyclase activity and specific alterations in G protein subunit steady state levels. Cultured smooth muscle cells obtained from porcine coronary artery were subjected to 1 day of cyclic stretch of 20 kPascals (24% maximum strain) at 60 cycles/min. Unstretched cells served as controls. Basal and stimulated adenylate cyclase activities were inhibited significantly in stretched (1 day) versus unstretched vascular smooth muscle cells. The reduction in adenylate cyclase activity observed after 1 day was associated with a modest (15%) but significant ($p<0.05$) reduction in steady state levels of G_{sa45}. The data support the hypothesis that chronic stretch of coronary vascular smooth muscle cells causes inhibition of adenylate cyclase activity and specific alterations in G protein subunit steady state levels. The G-protein-adenylate cyclase pathway may play an important role in the regulation of coronary blood flow in response to changes in intravascular pressure.